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# **Aggregating indices of governance quality: An exploratory factor analysis**

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**Defence R&D Canada**  
Technical Report  
DRDC Toronto TR 2011-022  
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## **Abstract**

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In this technical report, we used the exploratory factor analysis (FA) to examine 24 open-source governance indices measuring levels of democracy, economic development and human rights, in order to identify and describe patterns of relationships that may exist among them. The 24 variables used for the FA were selected from a comprehensive list of open-source databases obtained from Pavlovic, N. J., Hoshino, L. C., Mandel, D. R., & Dorn, A. W. (2008). The analysis produced a three-factor solution that explained the most variance and provided a theoretical interpretation in accordance to the already established definitions of good governance. We build on previous efforts by providing a more comprehensive analysis of a larger set of similar indices, proposing a new approach to interpreting multiple sources of data in an integrative manner, and offering further guidance on the use of these measures for assessing state governance.

## Résumé

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Dans ce rapport technique, nous avons eu recours à l'analyse exploratoire des facteurs (AF) pour examiner 24 indices de gouvernance de source générale qui visent à mesurer les niveaux de démocratie, de développement économique et de respect des droits humains, afin de détecter et de décrire les schèmes de relations qui peuvent exister entre eux. Les 24 variables employées pour l'analyse des facteurs ont été choisies d'après une liste complète de bases de données de source générale tirée Pavlovic, N. J., Hoshino, L. C., Mandel, D. R., & Dorn, A. W. (2008). L'analyse a produit une solution à trois facteurs qui explique le plus d'écart et fournit une interprétation théorique conforme aux définitions déjà établies de la bonne gouvernance. Nous avons mis à profit les travaux antérieurs en effectuant une analyse plus complète d'un plus grand ensemble d'indices semblables, proposant une nouvelle approche pour l'interprétation intégrative de sources de données multiples et formulant des conseils supplémentaires pour l'usage de ces mesures dans l'évaluation de la gouvernance étatique.

# **Executive summary**

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## **Aggregating indices of governance quality: An exploratory factor analysis:**

**Nada J. Pavlovic; David R. Mandel; DRDC Toronto TR 2011-022; Defence R&D Canada – Toronto; February 2011.**

**Background:** With the advent of the World Wide Web, there has been a proliferation of readily accessible open-source databases of quantitative indicators and indices that are used to measure and rank countries on various dimensions of state governance quality. These databases are largely used by international investors, official aid donors, policy makers, analysts, academia and governments, to inform on business investments, allocation of public funds, civil society advocacy or academic research, and for monitoring and evaluation of governance programmes.

Governance quality is a complex construct that has been studied extensively. There are a variety of definitions of good governance, but no common agreement on the components that comprise it. However, many governance measures developed to date have a high association with democracy, economic development and human rights. Despite the lack of clear definition, measuring governance is believed by many scholars and practitioners alike to be important for setting standards for improvement and achievement, and revealing where policy might prove most effective or funds can be best utilized.

Operationalizing the concept of good governance is contingent upon a good understanding and a clear definition of the component focus areas that are essential preconditions for building and sustaining good governance. Each of these individual criteria is measured with some degree of reliability and confidence by proxy indicators, which are then aggregated into a composite index to provide a more complete picture of the state of governance. However, there have been growing concerns about overreliance and misuse of these quantitative measures for making important decisions, questioning their validity, reliability and aggregation procedures. Recognizing these limitations, researchers have made efforts to critically evaluate and compare alternative indices, develop new measures, and provide a more comprehensive framework for measuring governance.

In this technical report, we used the exploratory factor analysis (FA) to examine 24 widely used open-source governance indices measuring levels of democracy, economic development and human rights, in order to identify and describe patterns of relationships that may exist among them. The analysis produced a three-factor solution that explained the most variance and provided a theoretical interpretation in accordance to already established definitions of good governance. We build on previous efforts by providing a more comprehensive analysis of a larger set of similar indices, proposing a new approach to interpreting multiple sources of data in an integrative manner, and offering further guidance on the use of these measures for assessing state governance.

**Results:** Our findings showed that the set of governance indices we examined is optimally grouped into three interrelated factors, which we term *Stability*, *Freedom* and *Humanity*. State stability is defined by its vulnerability to violent internal conflict and societal deterioration and is closely related to governance effectiveness. Freedom is measured according to two broad categories: political rights, or people's ability to participate freely in the political process and select their own government; and civil liberties, or freedom of expression and belief, freedom of association and free media. Humanity represents a socio-economic measure of the average achievements in a country in three basic dimensions of human development: a long and healthy life, knowledge, and a decent standard of living. Our analysis has shown that despite the lack of common definition or agreement on what constitutes good governance, or the lack of transparency about the aggregation method for constructing these indices, there are in fact underlying commonalities suggesting that they indeed measure the same complex construct (albeit, various aspects of it).

**Significance:** The present research offers a useful method for aggregating the data from indices developed by different organizational entities and for different purposes. Despite the large number of indices we considered, our FA yielded a parsimonious and interpretable three factor solution. Complex constructs such as state governance are by their nature multidimensional, and combining the available data in a meaningful way will ensure that the relevant dimensions are not overlooked and consequently excluded. In addition, aggregate measures produce more stable estimates, and circumvent the decision about which index is more appropriate for a particular analysis. The present research may be of value to members of Canada's defence and security community interested in understanding the governance characteristics of states worldwide. In particular, such knowledge may be of value in sensing transitions between stable and unstable (or fragile) states.

**Future plans:** Future research should focus on efforts to validate the constructs using more sophisticated techniques such as structural equation modelling or theoretical FA that allow for more systematic testing and predictions about relationship among the above indices and with other observed or latent constructs.

## **Sommaire**

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### **L'agrégation des indices de qualité de la gouvernance : analyse exploratoire des facteurs**

**Nada J. Pavlovic; David R. Mandel; DRDC Toronto TR 2011-022; R & D pour la défense Canada – Toronto; Février 2011.**

**Contexte.** Depuis l'avènement du World Wide Web, on assiste à la prolifération de bases de données de source générale d'indicateurs et indices quantitatifs qui servent à mesurer et à classer les États selon diverses dimensions de la qualité de leur gouvernance. Les investisseurs internationaux, les donateurs d'aide publique, les décideurs, les analystes, les universitaires et les gouvernements consultent largement ces bases de données pour éclairer leurs décisions concernant les investissements d'affaires, l'allocation des fonds publics, les campagnes de sensibilisation de la société civile et la recherche universitaire, et pour observer et évaluer les programmes de gouvernance.

La qualité de la gouvernance est un concept complexe qui a été longuement étudié. Il existe diverses définitions de la bonne gouvernance, mais on ne s'entend pas sur ses composantes. Cependant, de nombreuses mesures de la gouvernance mises au point jusqu'à maintenant sont associées étroitement à la démocratie, au développement économique et au respect des droits humains. Malgré l'absence de définition claire, de nombreux universitaires et autant de praticiens jugent important de mesurer la gouvernance pour définir des normes d'amélioration et d'accomplissement ainsi que pour révéler les situations où les politiques pourraient se révéler le plus efficaces et où les fonds pourraient être utilisés au mieux.

Pour opérationnaliser le concept de la bonne gouvernance, il faut bien comprendre et définir clairement les secteurs d'intérêt des facteurs qui sont des conditions préalables essentielles pour instaurer et entretenir la bonne gouvernance. Chacun de ces critères individuels est mesuré avec un certain degré de fiabilité et de confiance par des indicateurs supplétifs, qui sont ensuite agrégés dans un indice composite pour donner une image plus complète de l'état de gouvernance. Cependant, on s'inquiète de plus en plus de voir ces mesures quantitatives utilisées de manière abusive et avec une trop grande confiance pour la prise de décisions importantes, et l'on conteste leur validité, leur fiabilité et leurs procédures d'agrégation. Reconnaissant ces limites, les chercheurs ont fait des efforts pour évaluer et comparer de manière critique les indices de remplacement, mettre au point de nouvelles mesures, et mettre en place un cadre plus général pour la mesure de la gouvernance.

Dans ce rapport technique, nous avons eu recours à l'analyse exploratoire des facteurs pour examiner 24 indices de gouvernance de source générale qui visent à mesurer les niveaux de démocratie, de développement économique et de respect des droits humains, afin de détecter et de décrire les schèmes de relations qui peuvent exister entre eux. L'analyse a produit une solution à trois facteurs qui explique le plus d'écart et propose une interprétation théorique conforme aux définitions déjà établies de la bonne gouvernance. Nous avons mis à profit des travaux antérieurs en effectuant une analyse plus complète d'un plus grand ensemble d'indices semblables, proposant une nouvelle approche pour l'interprétation intégrative de sources de données multiples

et formulant des conseils supplémentaires pour l’application de ces mesures à l’évaluation de la gouvernance étatique.

**Résultats.** Nos constatations ont montré que l’ensemble d’indices de gouvernance que nous avons examiné est groupé de manière optimale dans trois facteurs interreliés, que nous avons appelés *stabilité*, *liberté* et *humanité*. La stabilité de l’État, qui est définie par sa vulnérabilité aux conflits internes violents et à la détérioration sociétale, est étroitement reliée à l’efficacité de la gouvernance. La liberté se mesure d’après deux grandes catégories : droits politiques, ou capacité des citoyens à participer librement au processus politique et à choisir leur gouvernement, et libertés civiles, c’est-à-dire liberté d’expression et de croyance, liberté d’association et liberté des médias. L’humanité représente une mesure socio-économique des réalisations moyennes dans un pays selon trois dimensions fondamentales du développement humain : une longue vie en bonne santé, le savoir, et un niveau de vie convenable. Notre analyse a montré que, malgré l’absence de définition commune et d’accord général concernant ce qui constitue la bonne gouvernance, et l’absence de transparence de la méthode d’agrégation employée pour construire ces indices, il existe en fait des caractéristiques communes qui suggèrent qu’ils mesurent effectivement le même concept complexe (fût-ce sous divers aspects).

**Signification.** La présente recherche propose une méthode utile pour agréger les données résultant d’indices mis au point par différentes entités à différentes fins. Malgré le grand nombre d’indices que nous avons considérés, notre analyse des facteurs a produit une solution à trois facteurs qui est sobre et interprétable. Les concepts complexes comme la gouvernance étatique sont par nature multidimensionnels; le fait de combiner les données disponibles de manière significative fera en sorte que les dimensions pertinentes ne passent pas inaperçues, ce qui causerait leur exclusion. En outre, l’agrégation des mesures produit des estimations plus stables et dispensent de décider quel indice est le plus approprié pour une analyse particulière. La présente recherche pourra être utile aux membres de la communauté canadienne de défense et de sécurité qui souhaitent comprendre les caractéristiques de gouvernance des États à l’échelle mondiale. En particulier, cette connaissance pourra être utile pour déceler les transitions entre États stables et instables (ou fragiles).

**Projets d’avenir.** De futures recherches devraient porter sur les efforts accomplis pour valider les concepts au moyen de techniques plus perfectionnées telles qu’une modélisation par équation structurelle ou une AF théorique permettant de tester et de prédire plus systématiquement les relations entre les indices ci-dessus ainsi que leurs rapports avec d’autres concepts observés ou latents.

## Table of contents

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Abstract .....	i
Résumé .....	ii
Executive summary .....	iii
Sommaire .....	v
Table of contents .....	vii
List of tables .....	viii
Acknowledgements .....	ix
1 Introduction.....	1
2 Governance quality: Concept and measurement.....	3
3 Critical evaluation of existing governance indices .....	5
4 Exploratory factor analysis: Methodology and results .....	7
5 Discussion and conclusions .....	10
References .....	13
Annex A .. Factor analysis results.....	15
List of symbols/abbreviations/acronyms/initialisms .....	23
Distribution list .....	24

## **List of tables**

---

Table 1. The list of 24 indices selected for the analysis.....	15
Table 2. Eigenvalues and proportion of explained variance for each factor in a 3-factor solution.....	18
Table 3. Communalities and factor loadings for each index entering the analysis. ....	19
Table 4. The factors and their corresponding indices.....	21

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# 1 Introduction

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With the advent of the World Wide Web (WWW), there has been a proliferation of readily accessible open-source databases of quantitative indicators and indices that are used to measure and rank countries on various dimensions of state governance as well as overall governance quality. Most of this information is freely available and used as a valuable and trusted resource by international investors, official aid donors, policy makers, analysts, academia, governments, and other information seekers. They are often intended to inform the user on business investments, allocation of public funds, civil society advocacy or academic research, and are being used for monitoring and evaluating governance programmes and projects or to establish benchmarks, objectives, targets and goals in the development context (United Nations Development Programme and Eurostat 2004).

The sheer abundance and diversity of these information sources form a broad spectrum of knowledge that, if used wisely, can facilitate the decision process and allow for better informed foreign policy, aid-allocation and investment outcomes, however, there have been growing concerns about the uses of quantitative measures of state governance as sole determinants in making these important decisions. Financial assistance programs like the Millennium Challenge Account (MCA), have been criticized for their overreliance on available indices in assessing governance quality of candidate states (Rotberg 2004). Similarly, some (Arndt and Oman 2006; Löwenheim 2008) regard composite indices, including the Global Competitiveness Index (World Economic Forum), World Governance Indicators (World Bank), Corruption Perceptions Index (Transparency International), and Freedom House (FH) Indices, as being over-used for screening investment locations and determining a state's ability to borrow money in the international financial markets.

Central to these dialogues about the misuse of composite indices are the issues of validity and reliability that are inherent in the very nature of what proxy measures represent, and the aggregation procedures used to generate the indices. One of the major appeals for using quantitative means for measuring governance is the ability to rank and compare countries in a consistent and systematic manner, allowing for quick assessment of performance, or a broader comparative analysis across countries. This advantage of reducing an abstract and complex phenomenon into a single score is obtained at a cost of losing the contextual detail associated with qualitative country reports.

In addition to the loss of such detail, quantitative approaches face a number of other challenges. First, there is a lack of a clearly defined concept of the good governance, or the agreement on one common definition among the organizations developing the indices. Second, the choice of component measures and methods of aggregation can be of questionable validity and reliability. Third, the lack of transparency and comparability over time also poses a threat to the valid and reliable use of composite indices. As a result, the use of these indices for discriminating across countries and identifying trends over time is viewed by some scholars (Arndt and Oman 2006; Thomas 2007) as inherently flawed, and ultimately not very informative or helpful to the potential recipient countries themselves for identifying how effectively to improve the quality of local governance.

Despite the possible shortcomings of quantitative indices of governance, they are still being widely used by the investors and donors, not to mention researchers who have used such indices in attempts to establish links between the quality of governance and other political phenomena, such as economic growth and the prevalence of terrorism incidents (Seldadyo, Nugroho et al. 2007; Tikuisis 2009). Recognizing the limitations of quantitative and composite measures, researchers have critically evaluated and compared alternative indices, developed new composite measures, or provided more comprehensive frameworks for measuring governance (Munck and Verkuilen 2002; Casper and Tufis 2003; Hadenius and Teorell 2004). Much work has also been done on compiling, summarizing and categorizing available indices, as well as developing guidelines and educating users about appropriate applications of these measures (Besançon 2003; Landman and Hausermann 2003; Eck, 2005; Arndt and Oman 2006; Pavlovic, Blackler et al. 2008; Pavlovic, Hoshino et al. 2008).

In similar effort, this report builds on previous literature by providing a quantitative (statistical) analysis of the underlying relationship among the large set of governance indices listed in *Table 1* in **Annex A**. Our report proceeds as follows: In **Section 2**, we discuss the meaning of *governance quality* as a concept. In **Section 3**, we briefly review critiques by other researchers of governance indices. In **Section 4**, we turn to our own research where we use exploratory factor analysis to examine the overarching structure of the indices listed in *Table 1*. **Section 5** concludes the report with a discussion of our findings and their significance.

## 2 Governance quality: Concept and measurement

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Arguably, good governance is a key to the success of any given country, and a prerequisite for effective and sustainable development in all sectors of society (Wyjad 2008). Governance can be defined as the manner in which authority is exercised in the management of a country's socio-economic resources (Seldadyo, Nugroho et al. 2007). The term originally emerged in the late 1980s, and was primarily used by the World Bank, which was at the time mainly concerned about the relationship between governance and economic performance. The United Nations Development Programme (UNDP) later expanded the term to include a political dimension, and more recently, the European Commission included human rights as another essential component of good governance (Landman and Hausermann 2003).

Why is it important to have a valid and reliable measure of governance quality? Measuring governance quality could assist with setting standards for improvement and achievement, in addition to indicating where funds could best be of use, and where policy might prove most effective (Besançon 2003). Many governance measures developed to date are associated with democracy, economic development and human rights. Research has shown that states with unconsolidated and partially democratic institutions are at higher risk of political crisis, engender more open conflict, and exhibit a greater capacity for human rights violations than either full democracies or entrenched autocracies (Goldstone and Ulfelder 2004; Wyjad 2008).

As well, fragile states are characterized by weak governance, as demonstrated by relationships established between governance and democratic processes, poverty and state failure (Rotberg 2004; Wyjad 2008). In fragile states, there is also a strong likelihood that an excess of grievances will provide a fertile ground for nurturing terrorism (Rotberg 2004; Tikuisis 2009). Political democracy has been linked to socioeconomic development, income distribution and rapid population growth (Bollen 1980; Tikuisis 2009). Countries with better governance exhibit long term economic growth, enhancement of human welfare and societal development (North 1990; 2005).

Operationalizing the concept of governance quality is contingent upon a good understanding and a clear definition of the component focus areas that are essential and necessary preconditions for building and sustaining good governance. For example, according to United Nations Department of Economic and Social Affairs (UN DESA), governance can be categorized into four main types: (a) *political or public*, whose authority is the State; (b) *government or public sector*, which relates to the process by which a society organizes and manages itself; (c) *economic*, whose authority is the private sector, relates to the policies, processes and mechanisms that are necessary to produce and distribute goods and services; and (d) *social*, whose authority is the civil society, and relates to the system of values and beliefs necessary for social behaviour to happen and public decisions to be made (Department of Economic and Social Affairs, 2007). While social governance provides moral foundation, economic governance provides a material foundation, and political governance guarantees the order and cohesion of the society (Department of Economic and Social Affairs, 2007).

Similarly, Country Indicators for Foreign Policy (CIFP) (2008) propose six focal areas that include rule of law, political stability and violence, human rights, government and market efficiency, government transparency and accountability, and democratic participation. Consistent

with this view, Rotberg (2004) suggests that one could assess governance by measuring the number of political goods that a state provides its citizens. Moreover, Rotberg proposes that stronger states may be distinguished from weaker states according to the effectiveness of their delivery. Political goods include, among other things, citizens' desires to be secure, exist under a robust rule of law, be free politically, enjoy stable economic environment, have access to high quality educational and health services, and so on. Although the foregoing definitions of governance may superficially differ, they are in fact based on common criteria from the political, economic and human/social realms of a society.

Each of these individual criteria in turn can be measured with some degree of reliability and confidence by using proxy indicators, which are numerical values that represent a state of a particular criterion for the society in question. Proxy indicators are still seen by most as being one of the most effective and direct ways of providing information about governance (Rotberg 2004). These proxy indicators can then be aggregated in a composite index to provide a more accurate and complete indication of the state of governance in a given country. Ideally, this is accomplished by using a theoretically defensible choice of proxy indicators that most accurately represents the concepts being measured, and combining them in accordance with an appropriate and transparent aggregation procedure that takes into account the degree of inter-relatedness and co-dependence of the component indicators. For instance, effective democratic participation would be impossible without the rule of law, which is in turn facilitated by transparent and accountable government mechanisms (Wyjad 2008).

### 3 Critical evaluation of existing governance indices

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There have been several attempts at comparing and critically evaluating existing governance indices using various statistical techniques. Historically, researchers tended to rely on high correlations among indices as sufficient evidence of construct validity for the proposed measure. However, an association between variables is only part of the answer because it only provides evidence of concurrent or convergent validity. It does not necessitate that the same concept is being measured – the variables may be causally related to one another or both variables may be spuriously related to a third, unobserved factor. In addition, even with a relatively high degree of correlation between the two measures, there is still a proportion of variance that will remain unaccounted. The unexplained variance could be due to random measurement error or to a pre-existing systematic bias (e.g., correlated error due to data coming from the same source) (Bollen 1980). Empirical evidence using various other statistical analyses has shown that using different governance indices can produce divergent results. This suggests that correlation analysis should not be interpreted as sufficient proof for construct validity.

For example, Casper and Tufis (2003) used regression analysis in one of their studies to compare the three widely used “democracy”<sup>1</sup> indices, Polity, Poliarchy and FH. They employed six socioeconomic and three institutional explanatory variables commonly used in democratization studies to test whether or not the three democracy measures yielded the same results (i.e., income, growth, trade independence, inflation, primary and secondary education comprised the socioeconomic variables; institutional variables used were three types of executive systems, presidential, parliamentary and other). The analysis revealed that using the same model and the same country – year data, but different measures of democracy, generated different results. The same explanatory variable was either significant or not, or it had a positive or a negative effect, depending on the index used in the analysis. Only four of nine variables were significant regardless of the measure used (income, parliamentary systems and party fractionalization were positively related, whereas growth was negatively associated with democracy). The relation of other variables was unstable and inconsistent across measures. In addition, the two robustness checks revealed that only three of nine variables produced stable results over time (again, income, parliamentary systems and party fractionalization were positively and significantly associated with democracy), while comparison across levels of development demonstrated party fractionalization as the only variable positively and significantly associated with democracy for both Organization for Economic Co-ordination and Development (OECD) and non-OECD members. These findings suggest that despite high correlations among the indices, they may be measuring conceptually distinct underlying constructs and should not be used interchangeably. Thus, Casper and Tufis (2003) recommend that the selection should be based on theoretical grounds rather than expediency or taste.

Using a different statistical approach, Hadenius and Teorell (2004) compared five well known indices of democracy (Alvarez et al 1996; Freedom House 2000; Marshall & Jagers 2002; Reich 2002; Vanhanen 2000). Through a concordance analysis, they demonstrated that aggregate level correlations concealed large discrepancies in how countries were graded at different segments of the democracy scale. The indices were standardized to a scale of 0 to 10 and the scale was then

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<sup>1</sup> In the reviewed literature, “democracy” and “governance” terms are sometimes used interchangeably when referring to the same indices.

divided into three intervals according to the degree of democracy (highest, middle and lowest). The degree of concordance was generally best in the highest end of the scale, worse in the lowest, and worst of all in the middle. The results also suggest that while the extreme differences would register in much the same way on the three scales, when more modest scale distances are concerned the coding became much worse. This has implications for comparisons across time, such that changes would be registered differently for countries on the middle and lower portions of the scale. In addition to the concordance analysis, the authors also conducted an external assessment of credibility of the FH and Polity indices by comparing scores on select countries with the independent yardstick, the democracy index developed by Hadenius (1992). Polity performed slightly better than FH both in terms of the mean deviation from Hadenius' index and in terms of the standard deviation of the scores. However, the combined index (mean score of the two) outperformed both of the individual components in terms of mean deviation and spread as well as across time periods. This suggests that there may be value added and increased credibility in aggregating scores across indices.

To further highlight the potentially confounding problems with substituting indices in comparative political studies, Munck and Verkuilen (2002) provided a systematic assessment of the large-N data sets on democracy most frequently used in current statistical research (Alvarez et al. 1996; Freedom House 2000; Gasiorowski 1996; Marshall & Jagers 2001). They started by identifying three challenge areas – conceptualization, measurement, and aggregation. Then, they outlined an integrated approach for data generation along with the set of guiding criteria designed to address those challenges. They exemplified the use of their approach by discussing each of the indices in terms of their successes or failures to meet these criteria (Munck and Verkuilen 2002). Further, to support their view that no single index examined offered a satisfactory response to all three challenges, they conducted an exploratory factor analysis (FA) to show that the assumption that all indices measure the same underlying construct is inherently flawed. The results of their analysis revealed different component loadings across indices (i.e., FH Civil Liberties and Political Rights loaded on a different dimension than other indices), suggesting potential multidimensionality of the data or the possibility that FH indices may be measuring a distinct concept.

The foregoing studies highlight the importance of cross-comparison and critical evaluation of available indices and the need to accumulate further evidence in order to assess the construct validity of these measures. In this technical report, we examined 24 open-source governance indices measuring levels of democracy, economic development and human rights by conducting an exploratory FA, in an attempt to further describe and summarize the pattern of relationships that may emerge among them. We build on previous efforts by providing a more comprehensive analysis of a larger set of similar indices, proposing a new approach to interpreting multiple sources of data in an integrative manner, and offering further guidance on the use of these measures for assessing state governance.

## 4 Exploratory factor analysis: Methodology and results

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Exploratory FA is a statistical data reduction technique that is applied to a large set of variables in order to examine which variables in the set group together and form coherent categories that are relatively independent of one another. The variables that are correlated with one another but largely independent of other categories are combined into factors<sup>2</sup>. Factors are thought to reflect certain underlying relationships that have generated the existing correlations among variables. The outcome of an exploratory FA is the most parsimonious set of factors that explains the maximal amount of variance, with the first factor explaining the most, and subsequent factors accounting for the remaining variability at a decreasing rate (Department of Economic and Social Affairs 2007; Tabachnik & Fidell 2001).

Exploratory FA is conducted in a following manner. The correlation matrix for the selected variables is calculated, and the factors are extracted from the matrix using pre-specified extraction and rotation methods. Factors are rotated to increase the interpretability of the solution without changing its underlying mathematical properties. An iteration process is then applied, which replaces the main diagonal elements of the correlation matrix with communality estimates<sup>3</sup>. The estimates of communalities improve with iterations, until the difference between two successive solutions is negligible. The whole procedure is then repeated multiple times, with the analyst systematically varying the parameters and the number or choice of variables entering the analysis, until the satisfactory number of factors is determined and the interpretability of the solution is maximized.

The 24 variables used for the FA were selected from a comprehensive list of open-source databases obtained from Pavlovic et al. (2008) and are listed in *Table 1*. Other than the open-source availability, the choice of indices was guided by the following criteria: (a) the dataset had to contain a rank order of countries along a measured dimension; (b) the data were in a country – year format and contained data for the 5 most recent years; (c) there was a sufficient amount of literature about the dataset to judge its credibility and use; and (d) a fairly representative set of variables measuring each of the three dimensions of good governance (democracy, economic development and human rights) was obtained.

A correlation analysis was initially conducted on the most recent data for selected indices to determine the amount of overlap in terms of available cases (i.e., countries) entering the analysis. This was done to ensure that there was a sufficiently high case-to-variable ratio (at least 5:1) necessary for the valid interpretation of the results. Consequently, indices with a small number of entries and the least amount of overlap (below 110) with the majority of indices were excluded from further analysis. These included Gender Empowerment Measure, Human Poverty Index 1, and Human Poverty Index 2. In addition, correlations revealed a low overlap between

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<sup>2</sup> “Factor” and “dimension” are used interchangeably, depending on the context. In describing the results of the statistical analysis, the term “factor” is used; when interpreting the results, “dimension” as related to the concept of good governance is deemed more appropriate.

<sup>3</sup> Estimates of shared variance among variables (or variance in each variable accounted by the factors).

Bertelsmann's Transformation Indices (BTI) and the Global Competitiveness Index (GCI), suggesting that they could not be entered into the analysis together.

Exploratory FA utilizing a principal component extraction technique and varimax rotation method with Kaiser normalization was conducted on the reduced set of indices, including both BTI and GCI. As suspected, the number of countries entering the analysis did not satisfy the case-to-variable criterion (the obtained ratio was 3:1, with 22 indices and 69 countries). The exclusion of BTI significantly improved the ratio to an acceptable level (20 indices and 92 countries). Removal of both did not result in significant improvement (19:109), and including BTI at the expense of removing GCI from further analysis produced the worst ratio of all (21:85). Consequently, the decision was made to further analyze the initial model that included GCI but not BTI.

The evaluation of the initial model revealed that the extraction communalities<sup>4</sup> for most variables were high (over .700, with the exception of the Global Peace Index with the value of .630), implying that the extracted factors represented variables sufficiently well. Two factors were extracted with eigenvalues<sup>5</sup> over 1, explaining 86.36% of variance. All variables had excellent loading<sup>6</sup> values on the respective factors, however, some of them loaded highly on the second factor, suggesting that an oblique rotation, which allows factors to be inter-correlated, was more appropriate. In addition, there were 38 (20%) nonredundant residuals with absolute values greater than .05, indicating potential existence of another factor<sup>7</sup>.

When a three-factor solution was used with a direct oblimin rotation method and Kaiser normalization, the proportion of variance explained increased to 90.49 (see *Table 2*), with a drop in the number of nonredundant residuals to 27 (14%), and the extraction communalities for most variables very high (in excess of .900). Most variable loadings were in the very good and excellent ranges, with the exception of the Democracy Rank, which loaded fairly high on both Factor 1 and Factor 2 (-.467 and .601, respectively). The communalities and factor loadings for all variables are listed in *Table 3*. In addition, Factor 1 correlated highly with both Factor 2 and Factor 3 (-.611 and .516, respectively), while the correlation between Factor 2 and 3 was fairly small (-.239). At closer inspection of how individual variables loaded on factors, it became evident that Factor 3 contained only two indices – Human Development Index and Gender Development Index. In a further attempt to improve the solution, the two variables were removed, resulting in a two-factor solution that was slightly worse in terms of total variance explained (88.26%), although better in terms of nonredundant residuals (16, or 10%), and with similar variable loadings and high extraction communalities. At this point, the decision was made to adopt the three-factor solution, for the following reasons: (a) the three-factor solution provided a more sound theoretical interpretation in accordance to the already established definitions of good governance; (b) the maximal possible number of variables was included in the analysis; (c) upon

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<sup>4</sup> If communality values equal or exceed 1, there is a problem with the solution. There is too little data, the starting communalities are wrong, or the number of factors extracted is wrong. Very low communality values indicate that variables are unrelated to others in the set.

<sup>5</sup> The amount of variance in the original variables accounted for by the factor.

<sup>6</sup> Correlations between observed variables and factors. As a general rule, only variables with loadings above .32 are interpreted. Loadings in excess of .71 (50% of overlapping variance) are considered excellent, .63 (40%) very good, .55 (30%) good, .45 (20%) fair, and .32 (10%) poor.

<sup>7</sup> In a good factor analysis, correlations in the residual matrix are small, indicating a close fit between the observed (produced by variables) and reproduced (produced from factors) matrices.

close inspection of individual numbers, the loadings and communalities were better; and (d) more total variance was explained.

## 5 Discussion and conclusions

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Our findings indicate that the considered governance indices can be grouped into three factors. The factors and their corresponding indices are listed in **Annex A, Table 4**.

The following indices loaded on Factor 1: Corruption Perception Index, Failed and Fragile States Indices, Global Peace Index, Index of Economic Freedom, Control of Corruption, Government Effectiveness, Political Stability, Rule of Law, Regulatory Quality, and Global Competitiveness. We call this factor *Stability*. State stability is defined by its vulnerability to violent internal conflict and societal deterioration and is dependent on the governing body's ability to exhibit three fundamental properties, authority, legitimacy and capacity<sup>8</sup> (CIFP: Failed and Fragile States; Fund for Peace 2007). A clear relationship between governance effectiveness and state stability has already been well established, and our results provide further evidence to this effect. For one, unconsolidated or partially democratic institutions pose a higher risk of political crisis, conflict and human rights violations, and it has been consistently shown that fragile states exhibit poor governance in general (Goldstone and Ulfelder 2004; Wyjad 2008). Conversely, better governance has been associated with long-term economic growth, enhancement of human welfare and societal development (North 1990; 2005).

The following indices loaded on Factor 2: Democracy Rank, Freedom of the Press, Civil Liberties, Political Rights, Press Freedom Index, Polity IV, and Voice and Accountability. We call this factor *Freedom*. Freedom is measured according to two broad categories: political rights, or people's ability to participate freely in the political process and select their own government; and civil liberties, or freedom of expression and belief, freedom of association and free media (Freedom House: Freedom in the World 2008; Kaufmann, Kraay & Mastruzzi 2007). The degree of freedom journalists and news organizations enjoy in each country is an outcome of the regime authority and the efforts made by the state to respect and ensure respect for this freedom.

Finally, it is interesting to note that the two Human Development Indices have loaded on a separate factor, indicating that they may be measuring a unique construct altogether. We call this factor *Humanity*. These indices represent a socio-economic measure of the average achievements in a country in three basic dimensions of human development: a long and healthy life, knowledge, and a decent standard of living. Longevity is measured by life expectancy; knowledge is measured by a combination of adult literacy and gross combined enrolment ratio at the primary, secondary and tertiary levels; standard of living is measured by purchasing power, based on real Gross Domestic Product (GDP) per capita adjusted for the local cost of living. While the other factors focus specifically on the health of the governing body and its effect on societal and personal freedoms, the Humanity factor is the indicator of individual quality of life and personal growth potential.

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<sup>8</sup> “Authority refers to the ability of the state to enact binding legislation over its population and to provide the latter with a stable and safe environment. Legitimacy refers to the ability of the state to command public loyalty to the governing regime and to generate domestic support for government legislation being passed and policies being implemented. Capacity refers to the power of a state to mobilize public resources for productive uses.” (Source: [http://www.carleton.ca/cifp/app/ffs\\_data\\_methodology.php](http://www.carleton.ca/cifp/app/ffs_data_methodology.php))

Our analysis shows that despite the lack of common definition or agreement on what constitutes good governance, or the lack of transparency about the aggregation method for constructing these indices, there are in fact underlying commonalities suggesting that they indeed measure the same complex construct (albeit, various aspects of it). In addition, even though our analysis yielded three distinct factors, it would be erroneous to assume that the three categories are independent dimensions. It is evident from the results of our FA that the first category was moderately related to the other two. The three aspects of good governance are not independent, and failure in one may adversely affect the other aspects. This interdependence can be exemplified by hypothetically examining the effect an inept and corrupt government could have on freedom and individual well-being.

With high degree of corruption and political pressure on the public and civil service, state resources may not be used productively or for the benefit of the public, and the capacity of the government to effectively formulate and implement sound policies and regulations may be jeopardized. In addition, the chances of economic success and prosperity may be reduced, as the wealth is mismanaged for personal gain, and the ability of ordinary citizens to make economic decisions on their own and be fully in control of their labour and property, may be lacking. This can adversely affect the individual quality of life and potential for personal growth. Moreover, in an attempt to conceal and sustain its structure and function, the governing body may make an attempt at controlling the free flow of information by using laws and legal institutions to restrict the media's ability to operate. In turn, this may restrict people's ability to freely participate in the political process and express their opinions and beliefs. Combined with the inability and unwillingness of the governing body to provide a stable and safe environment, the end outcome would be reduced public trust, confidence, respect and loyalty, and increased likelihood of political violence, and domestic or international conflict. There would be an increased risk of political instability and terror, and the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means would be higher. Hence, these nations will be characterized as the world's weakest states, highly susceptible to violent internal conflict and societal deterioration.

It is clear from the foregoing discussion that the factors are not mutually exclusive, but on the contrary, similar components are relevant to and shared across different indices. This is mainly because of the construct overlap, on the contextual level. For example, the Fragile States Index is comprised of various governance, economic, security and crime, human development, demography and environment indicators. Similarly, some indices, such as Global Peace Index, incorporate data from the same sources (e.g., World Bank) that others are based on (although additional data and different methodologies may be employed). However, although there may be overlap across indices that may account for the correlation with other factors, we argue that each index contributes a unique piece of the puzzle. This argument is further supported by our analysis, which reveals that in some cases removing indices from the analysis actually weakened the overall explanatory value of the model. Hence, integrating the indices in a coherent manner allows the researchers and analysts to base their decisions on a more comprehensive picture than that which any of the indices alone can provide.

Based on this argument, we propose an integrative approach to evaluating good governance. The new factor scores provide a means of aggregating original country scores to impose a more parsimonious yet comprehensive structure on various databases that can be used by the researchers and analysts. Complex constructs such as state governance are by their nature

multidimensional, and combining the available data in a meaningful way will ensure that the relevant dimensions are not overlooked and consequently excluded. In addition, aggregating measures produces more stable estimates, and circumvents the decision about which index is more appropriate for a particular analysis. Hadenius and Teorell (2004) have already provided some empirical evidence that the simple average of FH and Polity IV scores are a better measure of good governance when compared to a “yardstick” index, than either of them alone. Future research should focus on efforts to validate the constructs using more sophisticated techniques such as structural equation modelling or theoretical FA that allow for more systematic testing and predictions about the relationship among the above indices and with other observed or latent constructs.

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## Annex A Factor analysis results

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*Table 1. The list of 24 indices selected for the analysis.*

INDEX (in alphabetical order)	YEAR	SOURCE
Bertelsmann's Status Index (BSI)	2008	Bertelsmann Stiftung and the Centre for Applied Policy Research, University of Munich
Bertelsmann's Management Index (BMI)	2008	Bertelsmann Stiftung and the Centre for Applied Policy Research, University of Munich
Control of Corruption (WB CC)	2007	World Bank
Corruption Perceptions Index (TP CPI)	2008	Transparency International
Democracy Rank (DR)	2008	World Audit
Failed States Index (FP FSI)	2008	Fund for Peace and Foreign Policy magazine
Fragile States Index (CIFP FSI)	2007	Country Indicators for Foreign Policy, Carleton University
Freedom in the World – Civil Liberties (FH CL)	2008	Freedom House

Freedom in the World – Political Rights (FH PR)	2008	Freedom House
Freedom of the Press (FH FP)	2008	Freedom House
Global Competitiveness Index (GCI)	2008	World Economic Forum
Global Peace Index (GPI)	2008	Economist Intelligence Unit
Government Effectiveness (WB GE)	2007	World Bank
Human Development Index (HDI)	2008	United Nations Development Programme
Human Poverty Indices (HPI)	2008	United Nations Development Programme
Gender-related Development Index (GDI)	2008	United Nations Development Programme
Gender Empowerment Index (GEI)	2008	United Nations Development Programme
Index of Economic Freedom (IEF)	2008	Wall Street Journal and Heritage Foundation
Political Stability and Absence of Violence (WB PS)	2007	World Bank

Polity IV Project: Political Regime Characteristics and Transitions (PolIV)	2006	Center for International Development and Conflict Management, University of Maryland, and Center for Global Policy, George Mason University
Press Freedom Index (PFI)	2006	Reporters without Borders
Regulatory Quality (WB RQ)	2007	World Bank
Rule of Law (WB RL)	2007	World Bank
Voice and Accountability (WB VA)	2007	World Bank

*Table 2. Eigenvalues and proportion of explained variance for each factor in a 3-factor solution.*

Factor	Eigenvalue	Percent Variance	Cumulative Percent
1	15.173	75.865	75.865
2	2.099	10.495	86.360
3	.826	4.128	90.488

*Table 3. Communalities and factor loadings for each index entering the analysis.*

Variable	Communality	Factor 1	Factor 2	Factor 3
Corruption Perceptions Index	.929	.892	.002	.129
Democracy Rank	.955	-.467	.601	-.039
Failed States Index	.927	-.721	.195	-.192
Fragile States Index	.950	-.608	.208	-.354
Freedom of the Press	.925	-.401	.684	.058
Freedom in the World – Civil Liberties	.952	-.244	.782	-.070
Freedom in the World – Political Rights	.952	-.086	.892	-.090
Global Peace Index	.720	-.884	.047	.145
Gender Development Index	.949	.203	-.199	.766
Human Development Index	.952	.215	-.184	.766
Index of Economic Freedom	.752	.756	-.103	.082
Press Freedom Index	.825	-.341	.722	.259
Polity IV	.891	-.271	-1.059	.132

Control of Corruption	.929	.929	.029	.094
Government Effectiveness	.944	.831	-.003	.230
Political Stability	.785	.861	-.142	-.159
Rule of Law	.945	.928	.051	.131
Regulatory Quality	.916	.743	-.170	.177
Voice and Accountability	.978	.381	-.687	.052
Global Competitiveness Index	.921	-.631	-.168	-.555

Table 4. The factors and their corresponding indices.

Factor 1: Stability	Factor 2: Freedom	Factor 3: Humanity
Transparency International Corruption Perceptions Index (TI CPI)	World Audit Democracy Rank (DR)	United Nations Development Programme Gender Development Index (GDI)
Fund for Peace Failed States Index (FP FSI)	Freedom House Freedom of the Press (FH FP)	United Nations Development Programme Human Development Index (HDI)
Country Indicators for Foreign Policy Fragile States Index (CIFP FSI)	Freedom House Freedom in the World – Civil Liberties (FH CL)	
The Economist Global Peace Index (GPI)	Freedom House Freedom in the World – Political Rights (FH CL)	
Wall Street Index of Economic Freedom (IEF)	Reporters Without Borders Press Freedom Index (PFI)	
World Bank Control of Corruption (WB CC)	Polity IV	
World Bank Government Effectiveness (WB GE)	World Bank Voice and Accountability (WB VA)	
World Bank Political Stability (WB PS)		
World Bank Rule of Law (WB RL)		
World Bank Regulatory Quality (WB RQ)		
World Bank Global Competitiveness (WB GC)		

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## **List of symbols/abbreviations/acronyms/initialisms**

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BTI	Bertelsmann's Transformation Index
CIFP	Country Indicators for Foreign Policy
DRDC	Defence Research and Development Canada
FA	Factor Analysis
FH	Freedom House
GCI	Global Competitiveness Index
MCA	Millennium Challenge Account
OECD	Organization for Economic Co-operation and Development
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
WWW	World Wide Web

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(U) In this technical report, we used the exploratory factor analysis to examine 24 open-source governance indices measuring levels of democracy, economic development and human rights, in order to identify and describe patterns of relationships that may exist among them. The 24 variables used for the factor analysis were selected from a comprehensive list of open-source databases obtained from the DRDC Toronto Technical Report 2008-167. The analysis produced a three-factor solution that explained the most variance and provided a theoretical interpretation in accordance to the already established definitions of good governance. We build on previous efforts by providing a more comprehensive analysis of a larger set of similar indices, proposing a new approach to interpreting multiple sources of data in an integrative manner, and offering further guidance on the use of these measures for assessing state governance.

(U) Dans ce rapport technique, nous avons eu recours à l'analyse exploratoire des facteurs pour examiner 24 indices de gouvernance de source générale qui visent à mesurer les niveaux de démocratie, de développement économique et de respect des droits humains, afin de détecter et de décrire les schèmes de relations qui peuvent exister entre eux. Les 24 variables employées pour l'analyse des facteurs ont été choisies d'après une liste complète de bases de données de source générale tirée du rapport technique 2008-167 de RDDC Toronto. L'analyse a produit une solution à trois facteurs qui explique le plus d'écart et fournit une interprétation théorique conforme aux définitions déjà établies de la bonne gouvernance. Nous avons mis à profit les travaux antérieurs en effectuant une analyse plus complète d'un plus grand ensemble d'indices semblables, proposant une nouvelle approche pour l'interprétation intégrative de sources de données multiples et formulant des conseils supplémentaires pour l'usage de ces mesures dans l'évaluation de la gouvernance étatique.

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(U) governance indices, governance quality, factor analysis, indicators

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